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ABSTRACT

The knowledge gap hypothesis predicts that infusions of information into an environment will lead to stronger relationships between education and knowledge for higher socioeconomic (SES) segments of the population, and ultimately, a relative gap between higher and lower SES groups. The hypothesis usually focuses on mass media but is also relevant to small groups and one-to-one communication. In two studies, new parents' infant development knowledge was the focus. Two self-selected groups were examined--123 less educated first-time mothers from Belfast, Northern Ireland, and a more advantaged group of 117 mothers and fathers in Minneapolis, Minnesota. Variables were formal education, 2 modified Brazelton demonstrations of infants' abilities (face-to-face or small group), experience with babies, and interpersonal networks of friends and relatives. Among both groups, knowledge gaps tended to close or even reverse over about 2 months' time. The Brazelton interventions were effective among the less educated in decreasing knowledge differentials. Knowledge gaps based on experience also tended to narrow, but gaps widened between men and women. Largest inequities observed were those between parents who received a modified Brazelton demonstration on either a small group or individual level (or both) and those who did not have this intervention. Exposure to a form of the Brazelton contributed to decreased knowledge differentials; exposure to both forms nearly closed education-based gaps. (Contains 4 figures and 4 tables of data, 15 notes, and 65 references.) (Author/NKA)

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CHILDBIRTH AND INFANT DEVELOPMENT KNOWLEDGE GAPS AND "REVERSE GAPS": WHEN BOOKS ARE NOT ENOUGH

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CHILDBIRTH AND INFANT DEVELOPMENT KNOWLEDGE GAPS AND "REVERSE GAPS": WHEN BOOKS ARE NOT ENOUGH

The knowledge gap hypothesis predicts that infusions of information into an environment will lead to stronger relationships between education and knowledge for higher socioeconomic (SES) segments of the population and, ultimately, a relative gap between higher and lower SES groups. The hypothesis usually focuses on mass media but also is relevant to small groups and one-to-one communication, the levels of the two studies described here. New parents' infant development knowledge was the main focus. Knowledge differentials on parenting occur in many areas of this topic, although this subject also may be pertinent to "reverse gaps," in which the less educated are more knowledgeable than the more educated. Data from two self-selected groups are presented, a less educated group of mothers in Belfast, Northern Ireland, and a more advantaged group of mothers and fathers in Minneapolis. The information variables were formal education, two modified Brazelton demonstrations of infants' abilities (face-to-face or small group), experience with babies, and interpersonal networks of friends and relatives. "The Brazelton" previously has been found effective among both higher and lower SES parents, usually mothers. Among both groups, knowledge gaps tended to close or even reverse over about two months' time. The Brazelton interventions were highly effective among the less educated in decreasing knowledge differentials. Knowledge gaps based on experience also tended to narrow, but gaps widened between men and women. The largest knowledge inequalities observed were those between parents who received a modified Brazelton demonstration on either a small group or individual level (or both) and those who did not have this intervention. Exposure to a form of the Brazelton contributed to decreased knowledge differentials; exposure to both forms nearly closed education-based gaps.

CHILDBIRTH AND INFANT DEVELOPMENT KNOWLEDGE GAPS AND "REVERSE GAPS": WHEN BOOKS ARE NOT ENOUGH

Evidence supporting a hypothesis of increasing knowledge gaps between the "haves" and the "have-nots" has mounted steadily since its introduction (Tichenor, Donohue, & Olien, 1970). The majority of studies demonstrate information gathering and comprehension advantages of higher socioeconomic status (SES) groups over lower SES groups in many realms (Gaziano, 1983, 1995; Viswanath & Finnegan, 1996).

The knowledge gap hypothesis predicts that infusions of information into an environment will lead to stronger relationships between education and knowledge for higher SES segments of the population and, ultimately, a relative gap between higher and lower SES groups. The knowledge gap hypothesis usually focuses on mass media but also is relevant to small groups and one-to-one communication (Gaziano & Gaziano, 1996; Viswanath & Finnegan, 1996). The hypothesis states:

> As the infusion of mass media information into a social system increases, segments of the population with higher socioeconomic status tend to acquire this information at a faster rate than the lower status segments, so that the gap in knowledge between these segments tends to increase rather than decrease (Tichenor, Donohue, & Olien, 1970:59-160).

Knowledge gaps may be reduced or not occur under certain conditions, which were not included in this study.[1] Gaps have been identified on individual levels (Suominen, 1976; Ettema & Kline, 1977) and community levels of analysis (Olien, Donohue, & Tichenor, 1983; Viswanath, Finnegan, Hannan, & Luepker, 1991). The studies reported here were on a small group level, highlighting interpersonal communication variables, during about two months. Two groups are represented, a

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[1]These conditions include controversy, local scope of topic, homogeneity of community structure, or declining publicity with equalized forgetting in all SES groups (Tichenor, Rodenkirchen, Olien, & Donohue, 1973; Frazier, 1986; Viswanath et al., 1994; Donohue, Tichenor, & Olien, 1975; Griffin, 1990; Miyo, 1983).

less educated group of mothers in Belfast, Northern Ireland, and a more advantaged group of mothers and fathers in Minneapolis, Minnesota.

Interpersonal communication can help to narrow knowledge differentials (Parker, 1987), but not always (Horstmann, 1991). Viswanath and Finnegan (1996) and Chu (1985) have called for more study of the impact of interpersonal sources on knowledge gaps because results have been mixed and measurements or conditions not always comparable. In the only study located with a small group communication condition, Nazzaro (1989) varied a presentation about HMOs to elderly subjects, supplemented by mass media coverage, and found knowledge gaps.

Knowledge inequality evidence across time is not plentiful. Some conflicting evidence exists; however, gaps appear to widen or stay the same more often than to close (Gaziano, 1995). The best time trend research portrays gaps as opening and closing fluidly as conditions change over time (Viswanath et al., 1991, 1994).

Most knowledge gap studies concern public affairs or health topics, since knowledge inequalities in such areas have important consequences for differing social segments. Parenting, the topic of this report, is a less studied knowledge gap domain encompassing an array of issues, many with both health and public affairs implications, such as child development and mental health, social problems created by poor child health, and socialization for effective citizenship.

No knowledge gap studies specifically of parenting were found, although some research concerns relevant variables. Childers and Post (1975) described numerous information needs of lower SES segments, underscoring parenting and child development as particular areas which they valued but lacked the knowledge. Research since then has tended to concern ways in which parenting knowledge deficiencies contribute to social problems or ways in which knowledge inequalities can be overcome.

Parenting topics and social problems. Social problems such as drugs, crime, and babies born outside of marriage are linked to lack of parenting knowledge and skill. Maltreating parents often are characterized by low education, poverty, less liberal attitudes toward child education, punitive attitudes, and lack of childrearing knowledge, as well as isolation from others or interpersonal networks with similar disadvantages (Rodriguez & Cortez, 1988; Crittenden, 1985, 1988, 1996; Showers & Johnson, 1984; Wolfe, 1985). Accurate parenting knowledge is associated with more adaptive parenting attitudes and skills (Stevens, 1984).

Reducing knowledge inequalities. Maloni's (1994) data supported the knowledge gap hypothesis, and she concluded that less educated mothers may need extra assistance from nurses or may be less able to communicate their knowledge in written form. Parenting knowledge <u>needs</u> frequently vary with SES (Norr, Nacion, & Abramson, 1989). Much research on needs of new parents has concerned determination of parents' knowledge preferences and interests rather than measurement of specific items learned, and interest or concern has not necessarily ensured knowledge acquisition (Moss, 1981; Maloni, 1994). Adolescents (who often end their schooling early if they become parents) and young adults frequently have only limited knowledge about child development (Shaner, Peterson, & Roscoe, 1985) but if provided with educationally based services can gain generally accurate child development knowledge (Stern & Alvarez, 1992).

After 6-10 months of participation in an early childhood family education program, 92% of low-income parents reported their participation made a positive difference in their awareness and understanding of children and child development, in their confidence as a parent, and feelings of social support (Mueller for Family Education Resources of Minnesota and the Minnesota Department of Children, Families and Learning, 1996). Staff assessment of these parents confirmed greater

awareness of their children and child development. Cudaback, Dickinson, and Wiggins (1990) found that a year-long age-paced home learning program using monthly booklets promoted self-confidence in parents, raised their knowledge of child development, and increased their ability to nurture their babies effectively, especially for those who were considered to be most at risk for parenting difficulties--young, minority, less educated, and lower income parents. Several other investigations found limited impact on knowledge of such interventions as newsletters, booklets, or a teaching situation on parents' knowledge, although they did not measure SES (Jason, Pokorny, Kohner, & Bennetto, 1994; Laurendeau et al., 1991; Weinman, Schreiber, & Robinson, 1992).

Reverse knowledge gaps. Parenting topics may pertain to infrequent "reverse gaps," occurring when the less educated are more knowledgeable than the more educated. Because lower education tends to be correlated with having more children, the less educated might be expected to have more child rearing knowledge than the better educated. In addition, while the more educated are likely to rely on printed media more than the less educated (Tichenor et al., 1970; Olien et al., 1983; Gaziano & Gaziano, 1996), the more educated may be actually at a disadvantage with regard to parenting topics. Their potential over-dependence on books and other printed information sources can lead them to overlook interactive teaching processes and interpersonal communication, which may be more effective than print sources for teaching how to parent infants (Laurendeau et al., 1991).

Optimum time for interventions. Many experts view the period immediately following childbirth (postpartum period) as a time when parents are most open to new information (Brazelton, 1984; Caplan, 1957; Egeland, 1988; Egeland & Erickson, 1990). Further, several investigators have found a link between kinds of information given to primary caregivers (usually mothers) and adaptation and

parenting competence (Broussard & Hartner, 1970; Hall, 1980). Little research involves parents' use of various information sources (Maloni, 1994). Some researchers found mothers themselves were the major source for knowledge of infant capabilities after instruction in reading their infants' cues to physical and psychological needs, personality, and behavioral development (Maloni, 1994). Mothers' expectations of babies' capabilities tend to be related to the mothers' responses to the babies and their perceptions of the babies' abilities. Parents who do not believe their newborns can see, for instance, are less likely to engage their infants in reciprocal interactions (Crouchman, 1985).

The Brazelton Neonatal Assessment Scale (1984), developed by T. Berry Brazelton, provides training in awareness of infants' competencies and sensitivity to infants' cues and is based on the view that full-term healthy newborns are essentially social beings structured to elicit from the caregiver the organization they themselves lack. The babies' feedback to the caregiver enhances appropriate caregiving behavior. The assessment is an interactive process, usually performed one-on-one. The examiner and the caregiver participate in obtaining responses at whatever state the infants are in, and the parents learn how to model their responses in ways that bring about desired behaviors in their babies.

"The Brazelton" has been found to be effective among both higher and lower SES mothers, although most research has concerned only middle-class mothers (Belsky, 1985; Liptak, Keller, Feldman, & Chamberlain, 1983; MacCarthy & Brazelton, 1980; Myers, 1982). Lower-class mothers may be more likely to come from maladaptive environments and to possess inadequate parenting skills, compared to middle-class mothers (Jones & McCurdy, 1992; Crittenden, Partridge, & Claussen, 1991; Britt & Myers, 1994; Widmayer & Field, 1980, 1981). Some investigators have found the Brazelton to be effective among lower SES mothers as long as a year or

more (Widmayer & Field, 1980, 1981; Olsen, Olsen, Pernice, & Bloom, 1981). The Brazelton provides a way to demonstrate good parenting to parents of any SES who have lower parenting skills without focusing on the parents' behavior and arousing the parents' anxieties about that behavior. It creates an opportunity to let the parents feel proud and to show off their babies to other people, validating their importance as significant people in their babies' lives. These results suggest that interventions like the Brazelton can help to reduce parenting knowledge differentials between higher and lower SES groups.

The main sources of information on childbirth or infant development measured in the present study were amount of education possessed, modified Brazeltons in two forms (one-to-one and small group), experience with babies (including formal classes on the high school or college level), and interpersonal networks of friends and relatives. The principal researcher modified the Brazelton intervention by selecting certain orientation items, demonstrated states of consciousness depending upon each baby's state, and some motor, reflex behaviors. The purpose was not a full assessment but to help parents perceive their babies as unique and that they are the most important people in their babies' lives. A full Brazelton can take an hour or more, including scoring. The modified one took approximately 15 to 30 minutes, depending upon the individual parents and babies.

The hypotheses pertain to expected changes between the time subjects were recruited and one week postpartum, predicting that for both Minneapolis and Belfast subjects (except #3 asked only in Minneapolis):

A. <u>Knowledge gaps will be found according to differentials in the following information sources</u>:

1. Formal education.

2. A Brazelton demonstration to individual parents.

3. A Brazelton demonstration in a small group ("infant as a person class").

4. Experience with babies.

5. Friendship and kinship networks.

B. And knowledge gaps based on these information sources will widen over the two-month time period studied:

METHOD

The first data set included 123 primigravidas (first time mothers) in Belfast, Northern Ireland, recruited in their last month of pregnancy (Time 1a; refer to Figure 1), followed up in the hospital after delivery (Time 2a), and seen at discharge from the hospital (Time 3a). Time 4a, two months postpartum, is not reported here. Subjects are from the first author's master's thesis research (O'Leary, 1988). Knowledge inequalities were not part of the thesis and have not been reported elsewhere. Among this group, 66 women were selected by a random method to serve as an experimental group who received a modified Brazelton-based demonstration of their newborns' capabilities; 57 were in the control group.

FIGURE 1 ABOUT HERE

The second data set, from a descriptive study of the developmental process of parents at four timepoints in Minneapolis, MN (Figure 1), replicated and extended some aspects of the Belfast study, although the two studies were not identical. Subjects in both studies were self-selected. Time 1b questionnaires (before prenatal classes began, N = 117) were mailed to men and women enrolled in eight-week-long childbirth classes during the third trimester of pregnancy, and participation was voluntary. The first author and chief investigator taught the classes at a large metropolitan hospital where the babies would be born. She collected completed questionnaires at Time 1b and at Time 2b, the end of classes (N = 89). Following birth (Time 3b), she distributed questionnaires to fathers and

mothers, who returned completed instruments to her (N = 116). Participants took home questionnaires with envelopes in which to mail them back at Time 4b (one week postpartum, N = 74). A segment of the study at four months postpartum is not reported here because the number of cases was too small to analyze.

Potential sources of childbirth and infant development knowledge measured prior to the classes in Minneapolis included formal education, amount of experience with babies, and sizes of friendship and kinship networks.[2] Other potential sources (at Time 4b) were attending an "infant as a person class" in the hospital and having someone demonstrate their babies' abilities (both modified Brazeltons).[3] Participation was voluntary, not by random assignment, in the hospital after birth. The Belfast subjects were asked the same questions about interpersonal networks, but education was measured differently,[4] and experience with babies was not asked. About half the Belfast subjects received individual Brazelton demonstrations; no small group Brazelton was offered to them.[5]

The operational definition of knowledge gap (based on education) for both

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[2]Question wording was: (1) "What was the last grade or year of regular school that you completed and got credit for? (6 categories, ranging from "11th grade or lower" to "graduate work or degree beyond college"). (2) "How much experience have you had with babies? -- practically none at all, practical life experiences, or formal classes (high school or college)?" (3) "How many close friends do you have (people that you feel at ease with, can talk to about private matters, and can call on for help)?" (on a scale from 0 to 10 persons or more). (4) "How many relatives do you have that you feel close to?" (on a 10-point scale).

[3]Question wording: (1) "Did you attend the 'Infant as a Person Class' in the hospital? (2) "Did you have someone demonstrate your newborn's capabilities?" ("yes" or "no" responses to both questions).

[4]"At what age did you finish full-time education?" (in years)

[5]The Belfast subjects were in wards of eight to sixteen women, so nearby women could observe Brazelton demonstrations given to others. Incidental observers seldom gained correct knowledge. Women tended to be influenced by the demonstration only when their own babies were present.

samples was the difference in the magnitude of the relationship of education and knowledge between the more educated group and the less educated group. Comparisons were made within the Minneapolis and Belfast groups but not between them. Knowledge differentials based on other information source variables were measured also. Minneapolis subjects' subjective ratings of their knowledge about childbirth and infant development were assessed at times 1b and 2b, and at Time 4b they evaluated the amount they had learned on each topic.[6] Objective infant development knowledge items were asked at the same three times; this knowledge was more important theoretically than the self-rated knowledge items.[7] Questions on confidence about infant care accompanied these at the same times, and a confidence score was constructed by summing the numeric answers to seven items.[8] The Belfast subjects had the same Time 1a evaluation of their childbirth knowledge, and at discharge (Time 4a), a slightly differently worded question on amount learned and

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[6]The Time 1 and 2 wording was: (1) "How much do you think you know about childbirth at this time?" (on a scale from 1 = "nothing" to 5 = "almost everything"). (2) This was repeated for infant development. Time 4: (3) "How much do you think your childbirth classes helped you through this experience? Please use a scale from 1 to 5, on which 1 means 'not at all' and 5 means 'very much.'" (4) "How much do you think you have learned about infant development? Please use the same 1 to 5 scale."

[7]Eleven items, summed with low scores indicating accurate knowledge: "These questions are about what you expect from your baby. Circle one response for each item. At what age do you think your baby can [see, hear, recognize you, smile, follow your face from side to side with his/her eyes, look towards the sound of a toy, put a hand to his/her mouth, turn his/her head from side to side when lying on his/her stomach, comfort himself/herself, turn his/her head to feed, move about in his/her bed]?" (five categories: first day, 3-4 days, one week, 3-4 weeks, 6 weeks). (9 items asked in Belfast.)

[8]"How prepared do you feel to take care of a new baby?" (5 point scale from 1 = "not at all" to 5 = "extremely well"). Categories repeated for 6 more items on understanding what the baby wants, soothing it when it cries, bathing, feeding, changing its diaper, and giving it what it needs.

from whom.[9] Their infant development knowledge was assessed only at Time 3a, discharge, except for two items asked at times 1a and 3a (smile and recognize).

Other questions concerned age, employment status, whether or not subjects had been trying to get pregnant, and data on demographics and attitudes in both Minneapolis and Belfast, among other questions not reported here. In addition, scores on depression and anxiety (Zuckerman & Lubin, 1965) were constructed at times 1b, 2b, and 4b in Minneapolis and times 1a, 2a, and 3a in Belfast.

Although the subjects were not random samples, statistics were used, relying on the argument of Winch and Campbell (1969) that statistical tests can be applied to non-random samples to determine if real differences exist among subgroups. Conclusions apply only to the samples reported here.

In comparison to the Minneapolis subjects, the Belfast subjects were much younger, less educated, and less likely to be married (tables 1 and 2). About half had ended their education at less than 16 years of age; only 9.1% had continued their education beyond the age of 19.[10]

TABLE 1 ABOUT HERE

Table 2 shows education and other information variables. At Time 1b in Minneapolis, there were 62 women and 55 men, all first-time parents (four men had

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[9](1) "Overall, how much have you learned about babies during your stay in hospital? -- A lot, some but not a lot, or very little." (2) "From whom did you learn most? -- Other mothers, nurses, doctors, or other (specify)." (3) "Was the information given: new information, a repeat of information from antenatal classes, or a repeat of things you already knew?"

[10]In the English system, schooling ends at age 16, equivalent to a high school degree. Those who advance to technical school or college levels and end their education at ages 17-19 are roughly equivalent to U.S. adults with some college education.

been married before). The subjects tended to be better educated overall than the general metropolitan population, with the majority having some college or more education. Women were slightly more educated than the men (n.s.), and women tended to be younger than men (n.s.). Most were employed full-time. Nearly 9 in 10 subjects were married and living together. Only a handful did not have a partner also participating. About two-thirds had been trying to become pregnant. The less educated were less likely to be married or to have intended the pregnancy (n.s.).

TABLE 2 ABOUT HERE

Relationships of Information Source Variables

In the Belfast group, friend or kinship networks and having a Brazelton demonstration were unrelated to education (Time 1a). None of these variables was related to others except the correlation between number of close friends and number of close relatives was .56, $p \leq .001$.[11] In contrast, in Minneapolis, lower education was related to larger friend networks ($r = -.18$, $p \leq .05$), greater experience with babies ($V = .29$, $df = 1$, $p \leq .01$),[12] and having an individual Brazelton ($V = .22$, $df = 1$, $p \leq .05$), and or a Brazelton class ($V = .23$, $df = 1$, $p \leq .05$). Size of friend and kin networks was correlated at $r = .36$, $p \leq .001$ in Minneapolis. Amount of experience with babies was not related to having the class or the individual demonstration, but these two types of Brazelton were correlated ($V = .40$, $df = 1$, $p \leq .001$). All Minneapolis results are from Time 1b data, except for the two Brazelton forms, given at Time 4b.

Interrelationships of Knowledge Variables

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[11]All correlations reported are Spearman's rank-order rho.

[12]Cramer's V is reported for crosstabulation results.

The three Belfast knowledge measures were relatively uncorrelated (subjective childbirth knowledge, objective infant development knowledge, and amount learned in the hospital), but Minneapolis knowledge dependent variables were interrelated. At Time 1b, self-rated childbirth and self-rated infant development knowledge were correlated at $r = .60$ ($p \leq .001$). Self-rated childbirth knowledge and objective infant development knowledge were correlated at $r = -.34$ ($p \leq .01$). Lower objectively rated infant development knowledge scores indicated more accurate knowledge. The association between objective and subjective infant development knowledge was much lower, -.16, $p \leq .10$.

MANOVAs on Knowledge Scores

Several repeated measures multiple analyses of variance (MANOVAs) were performed on self-rated and objective knowledge scores of Minneapolis subjects to assess the influence of time (three points), parents' sex, and information source variables. MANOVAs were performed also on confidence scores with depression scores as covariates over three time points. Dependent variables were averaged over time to obtain a mean knowledge score or confidence score for each person and then the independent variables were evaluated. The evaluation of scores over time was the within factor, and their interactions, if any, with the grouping factors were noted. Covariates, if relevant, were first regressed on the dependent variable and then the effect of the covariate was removed in the analysis of the residuals.

RESULTS

Relationships of Knowledge and Information Source Variables

Education. Table 3 shows education-based knowledge gaps with each set of subjects. First, the largest gap occurs for objectively evaluated infant development knowledge, the type emphasized by the Brazelton, among the Minneapolis parents. Although barely noticeable at Time 1b, it became significantly larger by

Time 2b. At Time 4b, it was smaller and no longer significant, although the decreased sample size because of attrition is partly the reason for statistical non-significance.[13] A tiny gap in self-evaluated childbirth knowledge was nearly closed by Time 4b, and a minute gap in self-rated infant development knowledge became a slight reverse gap by Time 4b (all n.s.).

TABLE 3 ABOUT HERE

The Belfast mothers' objectively measured knowledge gap is the largest gap among the three types of knowledge measured for them but is not significant (all measured at one time only). Differentials for self-rated childbirth knowledge and amount learned in the hospital[14], are minuscule and non-significant.

These results did not support the hypothesis of knowledge differentials widening over time. Belfast mothers exhibited one gap at one point (n.s.).

Experience with Babies. Having experience with babies in everyday life or formal classes (asked only in Minneapolis) led to larger knowledge differentials than those found for education. Table 4 shows the relationship between experience and the three types of knowledge among the Minneapolis group. Means are shown but because distributions were not normal, more conservative Mann-Whitney U-tests were performed on knowledge dependent variables; however, statistical results were the same for both the non-parametric tests and t-tests. Formal classes and practical

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[13]The larger the sample, the greater the chance that a given correlation will be significant (Babbie, 1973). A researcher can conclude a particular difference is valuable within the context of a study without that difference having achieved statistical significance (Fitz-Gibbon & Morris, 1978).

[14]Nurses were the source of information for all of the most educated Belfast subjects and the majority of others. Other mothers were a distant second choice. A handful said other people, and only one mentioned doctors as a source. For the most part, the information was new to the subjects.

life experiences were combined into one category since few subjects had taken such classes (those who did had higher scores than those with everyday experience). All three knowledge gaps based on experience had closed and slightly reversed by Time 4b. Those with virtually no experience had slightly more accurate objective infant development scores at Time 4b than did the more experienced (n.s.). Note that self-rated knowledge question wording was slightly different at Time 4b.

These patterns did not support a hypothesis of increasing knowledge inequalities due to different levels of babycare experience.

TABLE 4 ABOUT HERE

MANOVAs performed on objective infant development knowledge showed interactions over time among parents' sex and babycare experience, as well as sex and education. A knowledge gap widened between men and women between times 1b and 4b with regard to education and experience both. Knowledge gaps between more and less educated women tended to close, while a gap remained between more and less educated men, both of which groups trailed behind the women (Figure 2). Less educated men made little progress during these time periods. The knowledge gap due to differences in childcare experience tended to close among men and among women, though women's knowledge levels surpassed the men's.

FIGURE 2 ABOUT HERE

Brazelton Interventions. The scores of Minneapolis parents who attended the hospital class and those who had the individual demonstrations (both forms of the Brazelton) were significantly better than scores of the non-participants (Table

4). Belfast results for individual Brazelton demonstrations were similar. Differentials between those receiving either the class or the one-to-one Brazelton were significantly larger than those for other information source variables.

Thus, these results supported the hypothesis on Brazelton-based gaps at one time only; no conclusions can be drawn over time for the Minneapolis sample. A limited two-point comparison in the Belfast data contradicts the over-time hypothesis (Figure 3). Two items in the infant development knowledge score were asked at times 1a and 3a (smile and recognize). A repeated measures multiple analysis of variance (MANOVA) gave significant results for the influence of both education and a Brazelton, with the latter leading to a striking narrowing of knowledge gaps due to education. Less educated women not exposed to the Brazelton gained least knowledge, lagging far behind the other three groups.

FIGURE 3 ABOUT HERE

Separate ANOVAs on the influence of each Brazelton intervention run separately on objective infant development knowledge scores showed both types of Brazelton to be significantly related to knowledge and not interacting significantly with parents' education (results not shown). Especially interesting were significant ANOVAs on the impact on knowledge of having both, only one of these, or none (not shown). The knowledge scores of parents' by education and by exposure to either Brazelton type appear in Figure 4. Exposure to a Brazelton intervention reduced education-based knowledge gaps. The less educated who received none had the largest (most inaccurate) knowledge scores. The less educated who accepted both Brazelton opportunities were nearly as knowledgeable as the more educated taking both.

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FIGURE 4 ABOUT HERE

Interpersonal Networks. For the Minneapolis parents, having more friends was moderately and significantly related to more accurate objective infant development knowledge and to subjective infant development knowledge, narrowing gaps (data not shown). Further, by Time 4b, having fewer friends was linked to objective infant development knowledge, a reversed gap (n.s.). Having more relatives and friends made a significant difference in Time 4b subjective ratings of amount of childbirth knowledge learned, the only results among interpersonal network independent variables which supported the hypothesis (but only at one point in time). Among the Belfast mothers, these variables had essentially no relationship to knowledge.

The Role of Confidence Scores in Knowledge Inequalities

One variable, confidence scores, was correlated highly with all the knowledge dependent variables: .42 with subjective infant care knowledge, $p \leq .001$; .33 with subjective childbirth knowledge, $p \leq .001$; and -.23 with objective infant care knowledge, $p \leq .01$ (sign is negative because lower scores mean more accurate knowledge). Higher confidence scores in Minneapolis parents were associated with lower education (a reverse confidence score gap of -1.9, $p \leq .05$), parents' sex (female), and greater experience with babies (gap = 3.3, $p \leq .001$. Subjects in either of these intervention groups (some chose to be in both) had significantly higher confidence scores than those not taking advantage of these opportunities. Parents taking either option overrepresented the less educated. Education did not remain significantly related to confidence scores over time.

Lower education was related to higher confidence scores of Belfast mothers

at times 1a and 3a, and at 3a, younger age was also associated with higher confidence scores. At Time 4a (a segment otherwise not reported here), however, lower education and higher scores on anxiety were predictors ($N = 65$). Scores on anxiety were highly correlated with depression scores.

CONCLUSIONS

The patterns among the information source variables were consistent; that is, knowledge gaps related to these variables tended to narrow or close over the two-month period, and some were reverse gaps. In this study of the impact of interpersonally distributed knowledge, the classic knowledge gap pattern of widening differentials was not supported by time trend data, although it was supported by data from one point in time. Perhaps results might have been different had information from mass media been included or if the study had involved a longer time period. Perhaps parenting information is disseminated most effectively in face-to-face situations. Research has shown only limited effectiveness of "small" media, such as booklets or newsletters, in communicating parenting knowledge. The parents who had the Brazelton class may have increased their knowledge more than the parents who had the individual Brazelton demonstration because the class had the added advantage of observing both their babies' development and the uniqueness of all the other babies and their parents involved in the group process.

A caveat is that both samples were convenience samples and their patterns are not projectible to other settings and populations. Results from the two studies were not contradictory, however. The less educated Belfast sample and the more educated Minneapolis sample displayed similar patterns in many cases. Of the several knowledge measures, the most important one was the objective infant development knowledge score. Belfast subjects were surveyed on this only once

except for two items, and Minneapolis subjects, three times. The Minneapolis gap on this topic due to education increased and then decreased a bit. Belfast women evinced a gap, but the trend for two knowledge items from the overall score at two times showed that knowledge gap to be decreasing.

The face-to-face interventions, singly or together, were related to larger knowledge inequalities in both samples than were the other information source variables; however, the impact of these over time could not be tested in this study. Interpersonal networks of friends and relatives were associated with knowledge gaps at levels much less than those of the other information source variables. The hypothesis regarding interpersonal influence was supported only in Minneapolis and only at discharge.

Exposure to Brazeltons (versus non-exposure) contributed to the largest information source effects on knowledge differentials, among the types of information sources included; yet, less educated parents who received Brazeltons narrowed knowledge gaps and those with two types of Brazelton exposure had nearly caught up with more educated parents taking two.

The setting in which the Brazelton is done can influence communication effectiveness. This report concerns hospital-based personal or group demonstrations. Brazelton (1990) indicated problems of initial distrust among the lower-class mothers, who perceived his researchers as representatives of a middle-class system. Several in-home meetings took place with this subgroup before trust was established, and learning took place.

Confidence in babycare abilities played a major role in having high knowledge scores, especially with regard to objective infant development knowledge. Confidence scores were higher among women, the more experienced in babycare, and those scoring lower on depression. Education correlated less with

confidence scores than did experience. The link between Brazelton interventions and decreased knowledge gaps may be partly through building parents' confidence in their childcare abilities.

Since the less educated Minneapolis parents tended to have significantly more friends than the more educated parents (partly a result of the less educated parents' lower mobility and longer tenure in the community), more experience with babies, and higher confidence scores, the influence of lower education may be masked in initial results. In the types of knowledge studied, the less educated had a greater advantage over the more educated at Time 1b, of interest as they were underrepresented in the sample. If they had had greater representation, this result might have been more pronounced.

Despite connections among high education, less childrearing experience, and lower confidence in caring for babies, the more educated Minneapolis parents were not more likely to take advantage of the Brazelton information sources. Perhaps they thought their educations and information search skills were sufficient for their parenting information needs, or perhaps they felt threatened because of lack of competence because they were used to knowing their roles in their professions. After all, anyone can be a parent. Yet the dynamics of taking on the parent role and emotional upheaval of becoming a parent are not readily learned from books, which this group might typically consult for knowledge.

A tendency for more educated mothers and fathers to score higher on depression than the less educated parents at Time 4b partly accounts for the weak relationship between education and knowledge by the last wave of the study, especially in Minneapolis.[15] Well-educated parents had both advantages and

[15]Both men and women can experience depression associated with the birth of a child, and it is not unusual for both partners to be depressed (Ferketich & Mercer, 1995; Ballard et al., 1994; Harvey & McGrath, 1988).

disadvantages in gaining infant development knowledge in this study. Parents in this report exhibited the classic pattern of knowledge-education differentials found by others (Maloni, 1994; Crittenden et al., 1991; Childers with Post, 1975). Nevertheless, higher education could not easily overcome lack of babycare experience or risk of scoring high on depression, two characteristics which tended to correlate with higher education.

Parenting topics may have different patterns of relationship with education than do many patterns reported for health and public affairs-citizenship kinds of knowledge differentials. Learning about parenting develops during formative years, including how people know about and relate to infants. While the more educated may read more about parenting issues, reading alone cannot compensate for knowledge gained through modeling parenting behavior and learning to trust one's own intuition about infant behavior. Observing the babies and experiencing the process with others strengthen the Brazelton as an intervention and underscore Maloni's point (1994) that knowing infants' capabilities as persons and knowing how to take care of them are separate topics. Knowing one does not necessarily predict knowledge of the other. Finally, each baby is different, making it unlikely that any one book is about "your baby." Parenting knowledge and skills are difficult to acquire for most people, regardless of SES.

The kind of knowledge studied is only one of many components of parenting knowledge, and the relationship of the variables in this report should be explored in other settings, especially involving randomization and generalizability. The role of formal education and other information variables in parenting information gaps should be studied further. Confidence, depression, anxiety, and kinds and number of information sources also are important variables to be examined in their potential connections to knowledge gaps over time. Moreover, the differences

between parenting knowledge gaps and gaps involving other topics may contribute deeper insights into knowledge differentials overall.

Parenting knowledge, attitudes, and behavior are all involved in the most critical component of early child development, parents' sensitivity to their babies' capabilities and needs (Belsky, Robins, & Gamble, 1984; Laurendeau et al., 1991), and their interrelationships need to be better understood (Britt & Myers, 1994). Increases in knowledge (and decreases in education-based knowledge differentials) do not necessarily mean change in attitudes or behavior. Knowledge may be easier to change than behavior (Mueller, 1996; Stern & Alvarez, 1992). Related parenting behaviors such as ignoring children's education needs ultimately help to perpetuate the cycle of low knowledge levels, low education levels, poverty, and neglect (Erickson & Egeland, 1996).

Mueller (1996:19) summed up parenting research challenges:

> The capacity of parents to parent, the quality of the relationship parents have with their children, and the ability of parents and educators over time to work as partners in producing educated and successful young people is an important national issue.

Although previous knowledge gap research has been little concerned with the subject of parenting, implications of this issue for quality of life and solving social problems invite researchers to focus greater attention on parenting topics.

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Belfast Subjects:	Women Only
Time 1a: About 1 to 4 weeks before birth	128
Time 2a: As soon as possible after birth	126
Time 3a: One week postpartum (discharge)	123

Minneapolis Subjects:	Women	Men	Total
Time 1b: Before 8-week prenatal class began	62	55	117
Time 2b: The last night of class	45	44	89
Time 3b: As soon as possible after birth	59	57	116
Time 4b: One week postpartum	39	35	74

Note: Last wave of each study excluded here because of small numbers of cases.

FIGURE 1 Waves of the Studies.

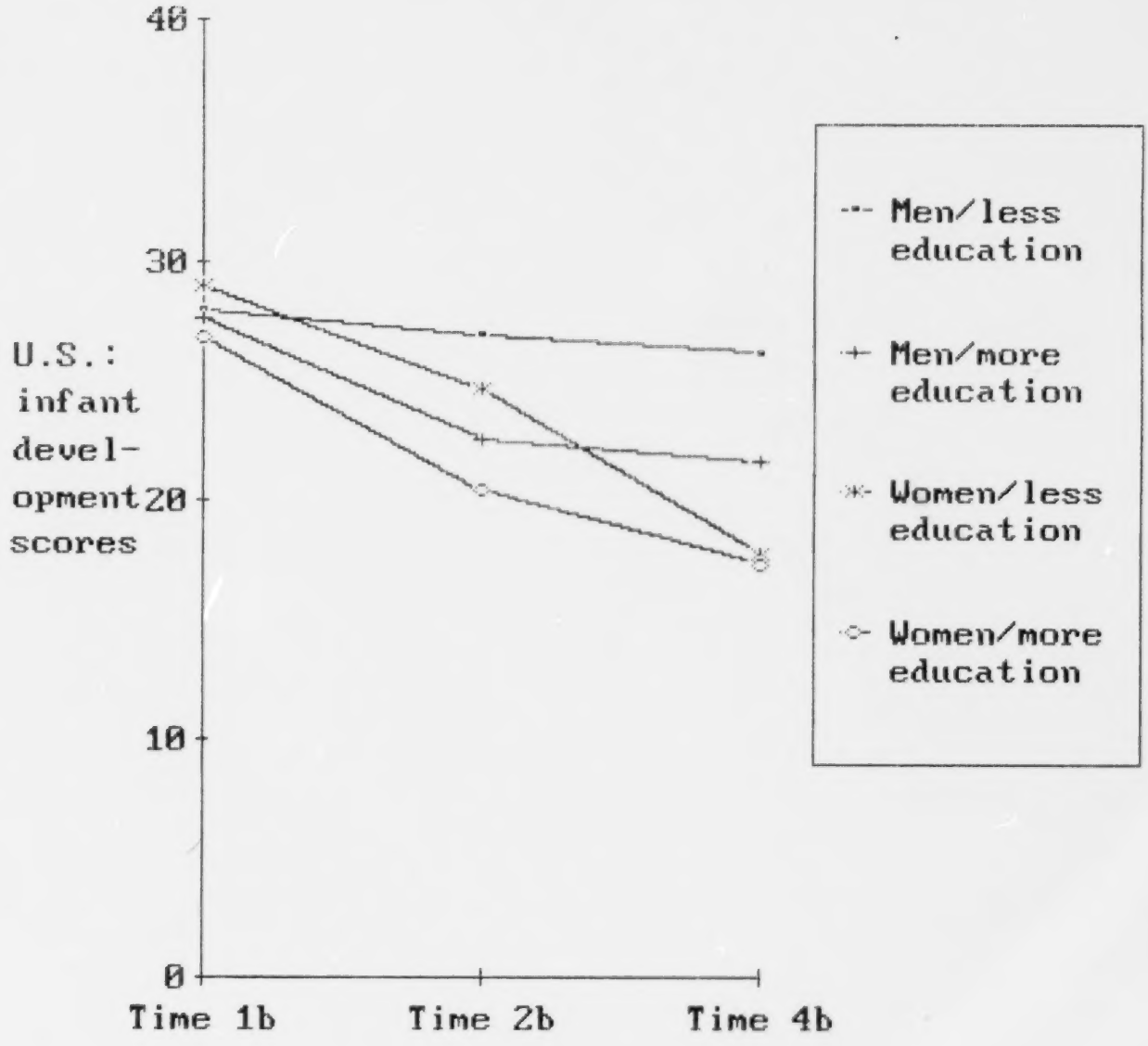

FIGURE 2 Minneapolis parents' objective infant development knowledge scores by parents' sex and education. Note: lower scores mean more accurate knowledge. (N_{1b} = 64, 9 cases missing; N_{2b} = 57, 16 cases missing; N_{4b} = 62, 11 cases missing).

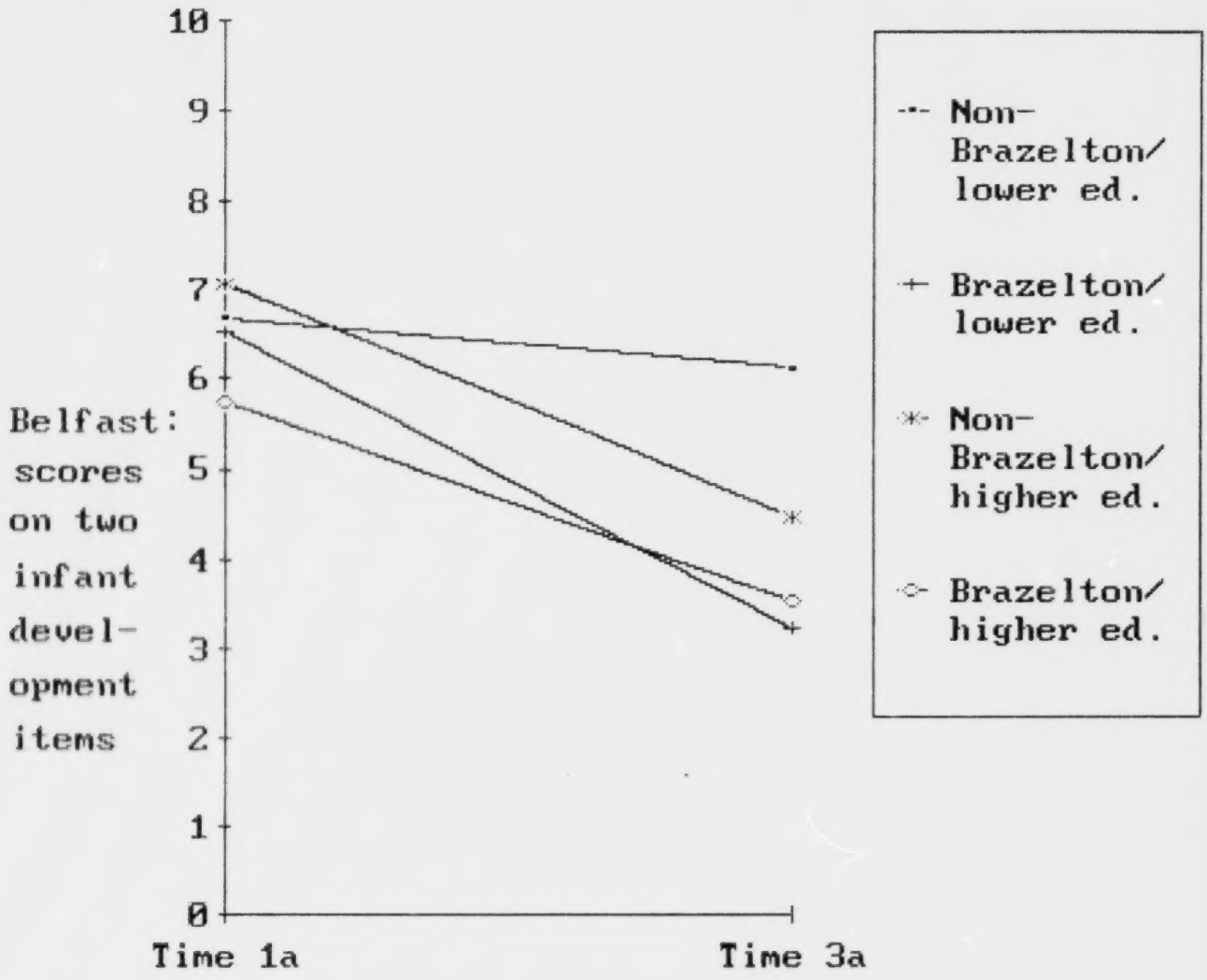

FIGURE 3 Comparison of Belfast mothers' education and having an individual modified Brazelton demonstration of infants' abilities, with respect to knowledge of two infant development items ("smile" and "recognize" combined into a score) (N_{1a} = 121, 2 cases missing; N_{3a} = 116, 7 cases missing). Lower scores mean more accurate knowledge.

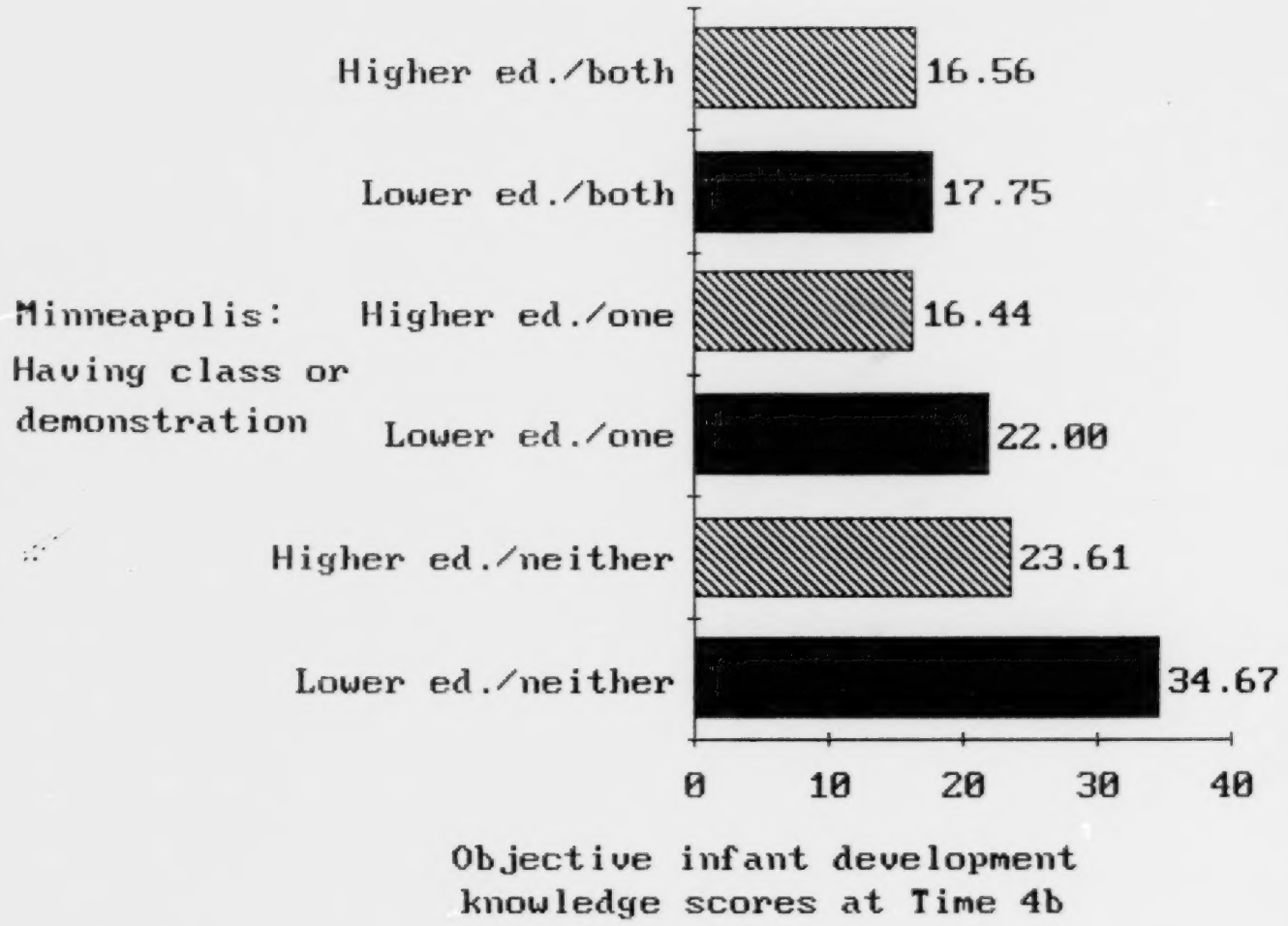

FIGURE 4 Minneapolis parents' objective infant development knowledge scores at Time 4b by education and having one, two, or no modified Brazelton interventions ("infant as a person" class and demonstration of infants' abilities). Note: lower scores mean more accurate knowledge. (N = 62, 11 cases missing.)

TABLE 1
Parents' Demographic Characteristics

Characteristics	Belfast Women (N=123)	Minneapolis Women (N=62)	Minneapolis Men (N=55)
Age			
Age 29 or younger	91.1%	59.0%	47.3%
30 years old or older	8.9	41.0	52.7
Marital Status			
Married	56.9	85.5	89.1
Not married/married & not living together	43.1	14.5	10.9
Employment Status (multiple answers allowed)			
Employed full-time		79.0	90.1
Employed part-time		14.5	7.2
Looking for work, unemployed, laid off		2.0	---
Homemaker		10.0	---
Student		6.0	9.0
Employed before pregnancy	18.5		
Employed during pregnancy	66.4		
Never employed	15.1		
Had been trying to become pregnant:			
Yes	45.9	62.9	65.5
No	54.1	37.1	34.5

Note: Missing values excluded. Belfast: range of missing observations was 0 to 1. Minneapolis: women, 0-1 missing; men, 0-1 missing.

TABLE 2
Parents' Information Source Variables.

Information Sources	Belfast	Minneapolis	
	Women	Women	Men
	(N=123)	(N=62)	(N=55)
Education (Minneapolis)			
High school graduate or less/vocational school		5.0%	14.8%
Attended college, did not graduate		30.0	24.1
College graduate		38.3	33.3
Graduate work beyond college degree		26.7	27.8
Education (Belfast), age at which full-time schooling ended			
<16 years old (similar to H.S. grad or less)	49.6%		
17-19 years old (similar to attending college or vo-tech training beyond high school)	41.3		
>19 years old (some college or more education)	9.1		
Interpersonal Networks			
Mean number of close friends on a scale from 1 to 10 or more.	5.15 (sd=2.87)	5.23 (sd=2.36)	5.36 (sd=2.67)
Mean number of relatives which subjects feel close to on scale from 1 to 10.	5.26 (sd=3.02)	5.95 (sd=2.75)	6.55 (sd=3.03)
Amount of experience with babies (Time 1b).			
Practically none at all	---	30.6%	43.6%
Practical life experiences	---	56.5	49.1
Formal classes (high school or college)	---	12.9	7.3
Attended Brazelton class, "infant as person" in hospital, Time 4b.		(N=38)	(N=35)
Yes	---	39.5%	28.6%
No	---	60.5	71.4
Had individual Brazelton, T1a Belfast, T4b Mpls.)			
Yes	53.7%	71.1	60.0
No	46.3	28.9	40.0

Note. Missing values excluded. Minneapolis: N_{1a} = 117, N_{4a} = 73. Belfast: range of missing observations was 0 to 1. Minneapolis: men or women, missing 0-1.

TABLE 3
Parents' Knowledge Scores by Education

Type of Knowledge Score	Minneapolis		
	Higher Education	Lower Education	Knowledge Gap[a]
Objective infant development[b]			
Time 1b	33.1	32.4	.7
Time 2b	24.6	28.0	-3.4*
Time 4b	19.5	22.2	-2.7
Self-rated childbirth			
Time 1b: how much know	3.0	2.7	.3
Time 2b: how much know	3.8	3.9	-.1
Time 4b: how much learned	4.4	4.3	.1
Self-rated infant development			
Time 1b: How much know	2.7	2.6	.1
Time 2b: How much know	3.2	3.3	-.1
Time 4b: How much learned	3.7	3.9	-.2

	Belfast		
	Higher Education	Lower Education	Knowledge Gap[a]
Objective infant development[b] (Time 3a)	17.3	18.9	-1.6
Self-rated childbirth (Time 1a)	2.9	2.8	.1
Amount learned about babies in hospital (Time 3a)	1.2	1.1	.1

* $p \leq .05$ (2-tailed tests).

a Gap = more educated group's score minus less educated group's score.
b Lower scores mean more accurate knowledge.

Note: Minneapolis: N_{1b} = 109-117; N_{2b} = 80-86; N_{4b} = 60-73; Belfast: N_{1a} = 121-122; N_{3a} = 108-109.

TABLE 4
Parents' Knowledge Scores by Experience, Classes, and Brazelton

By Type of Knowledge Score	Minneapolis: Formal Classes/ Life Experiences	Minneapolis: Practically None	Knowledge Gap[a]
Objective infant development[b]			
Time 1b	31.6	34.4	-2.8*
Time 2b	26.2	25.3	.9
Time 4b	21.3	19.8	1.5
Self-rated childbirth			
Time 1b: how much know	3.0	2.7	.3*
Time 2b: how much know	3.8	3.8	---
Time 4b: how much learned	4.3	4.4	-.1
Self-rated infant development			
Time 1b: how much know	2.9	2.3	.6***
Time 2b: how much know	3.3	3.1	.2
Time 4b: how much learned	3.5	3.9	-.4*
Time 4b only:	**Brazelton Class In Hospital**	**No Brazelton Class**	**Knowledge Gap[a]**
Objective infant development[b]	16.8	22.0	-5.2***
Rate amount learned/childbirth	4.5	4.3	.2
Rate amount learned/infant dev.	4.0	3.6	.4*
Time 4b only:	**Had Brazelton Demonstration**	**Did Not Have Demonstration**	**Knowledge Gap[a]**
Objective infant development[b]	18.2	24.2	-6.0***
Rate amount learned/childbirth	4.2	4.6	- .4*
Rate amount learned/infant dev.	3.7	3.7	----

	Belfast: Had Brazelton Demonstration	Belfast: Did Not Have Brazelton	Knowledge Gap[a]
Time 3a only:			
Objective infant development[b]	14.6	22.7	-8.1***

* $p \leq .05$. *** $p \leq .001$. (2-tailed tests).

a Gap = Left column score minus right column score.

b Lower scores mean more accurate knowledge.

Note: Minneapolis: N_{1b} = 109-117; N_{2b} = 80-86; N_{4b} = 60-73; Belfast: N_{1a} = 121-122; N_{3a} = 108-109.